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United States Patent [19]
Pollacco[11] **Patent Number:** **5,305,910**
[45] **Date of Patent:** **Apr. 26, 1994**[54] **CONTAINER FOR ENGINE OIL**[75] **Inventor:** **Paul J. Pollacco, Alexandria, Va.**[73] **Assignee:** **Amersave Products Corporation,
Alexandria, Va.**[21] **Appl. No.:** **977,759**[22] **Filed:** **Nov. 17, 1992**[51] **Int. Cl.:** **B65D 25/28**[52] **U.S. Cl.:** **220/771; 141/343;
215/100 A**[58] **Field of Search:** **215/1 C, 100 A;
141/338, 343; 220/771**[56] **References Cited****U.S. PATENT DOCUMENTS**

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4,403,692	9/1983	Pollacco	206/223
4,524,866	6/1985	Pollacco	206/223
4,533,042	8/1985	Pollacco	206/223

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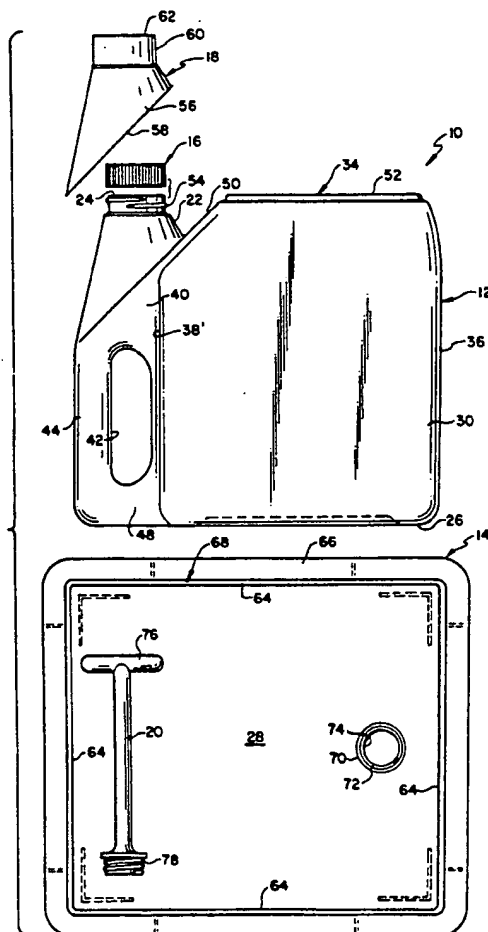
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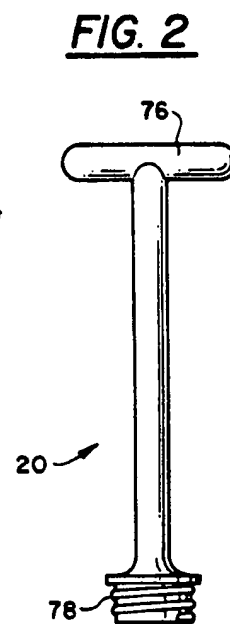
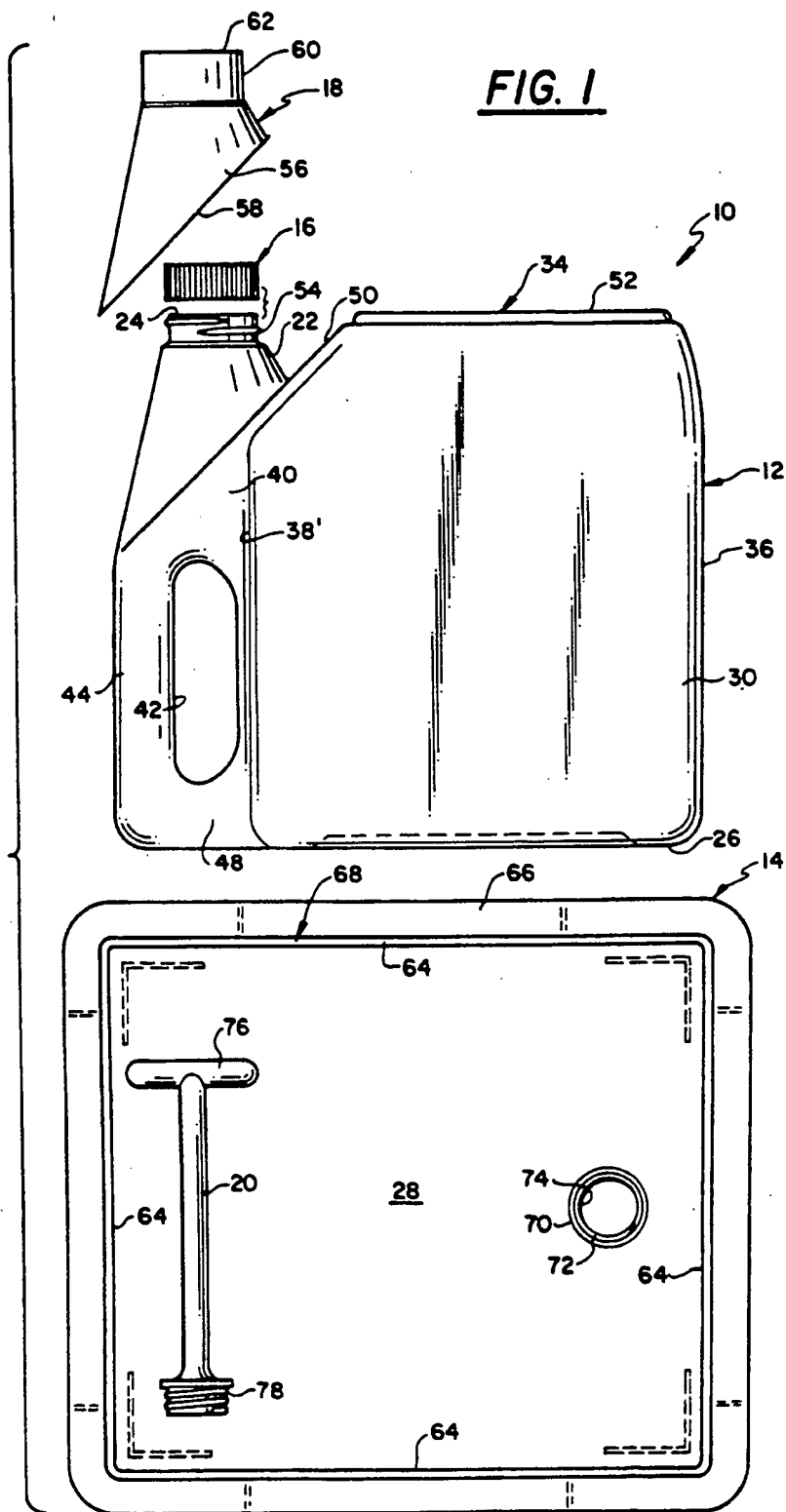
Primary Examiner—William I. Price*Attorney, Agent, or Firm*—Cushman Darby & Cushman

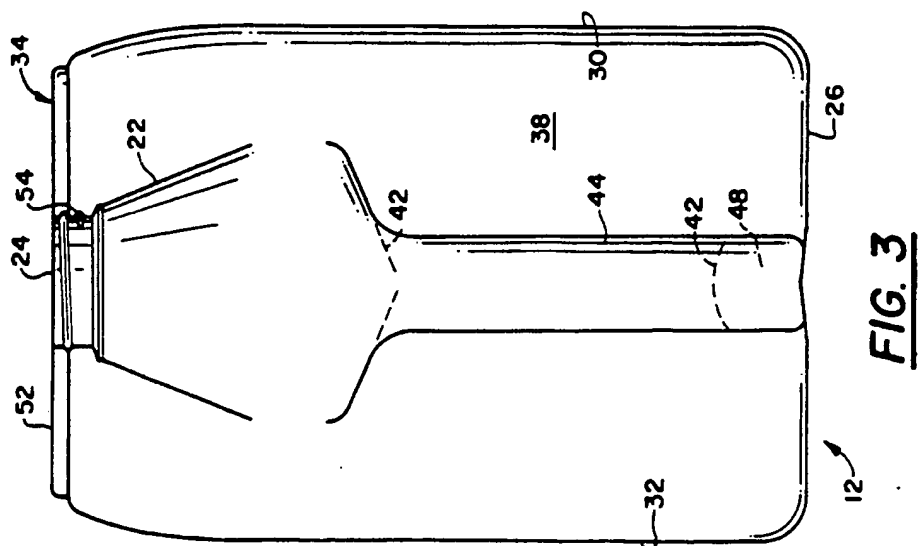
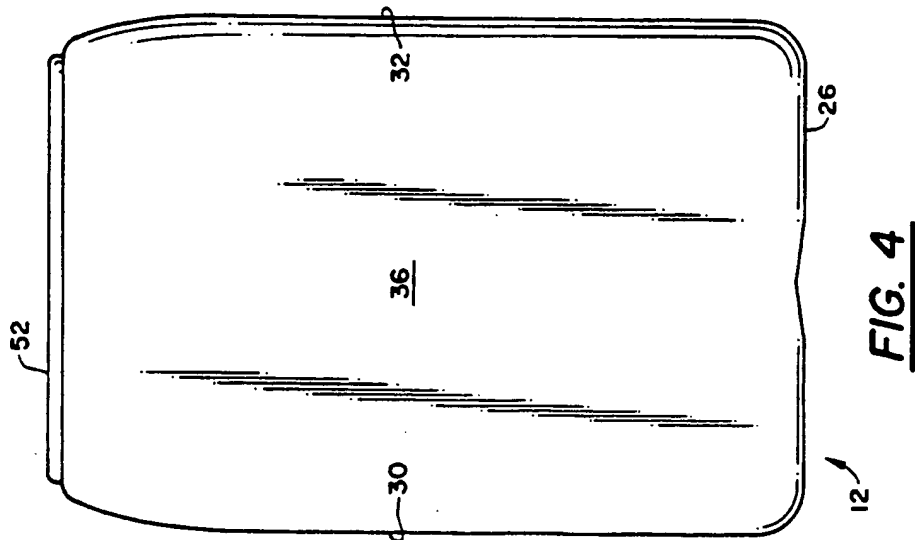
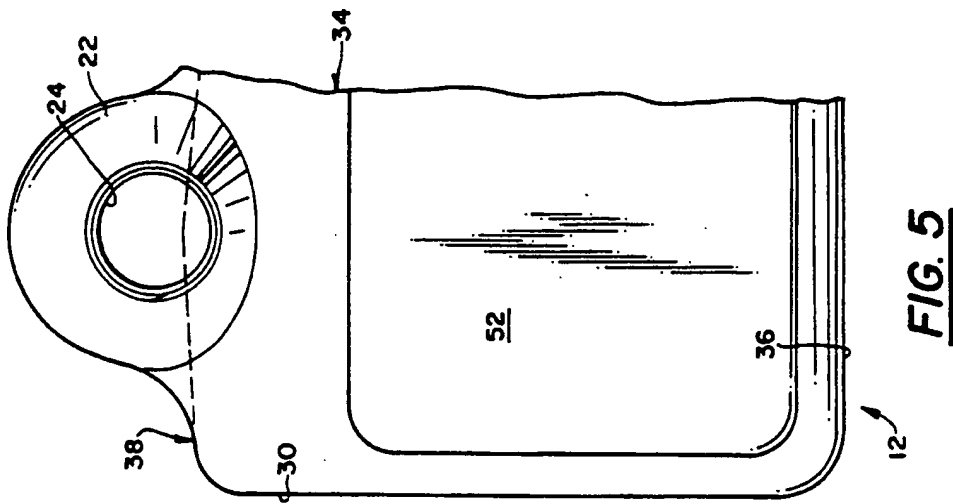
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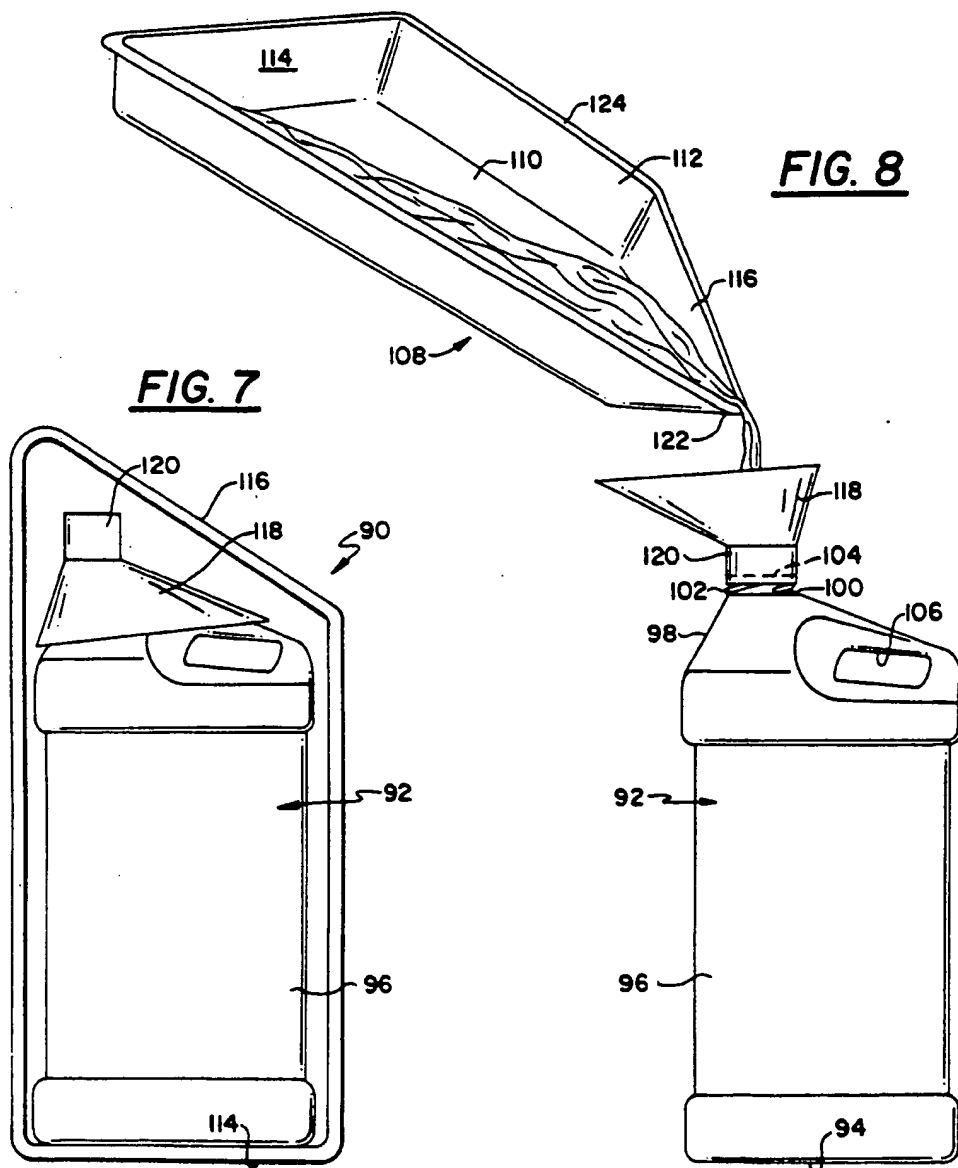
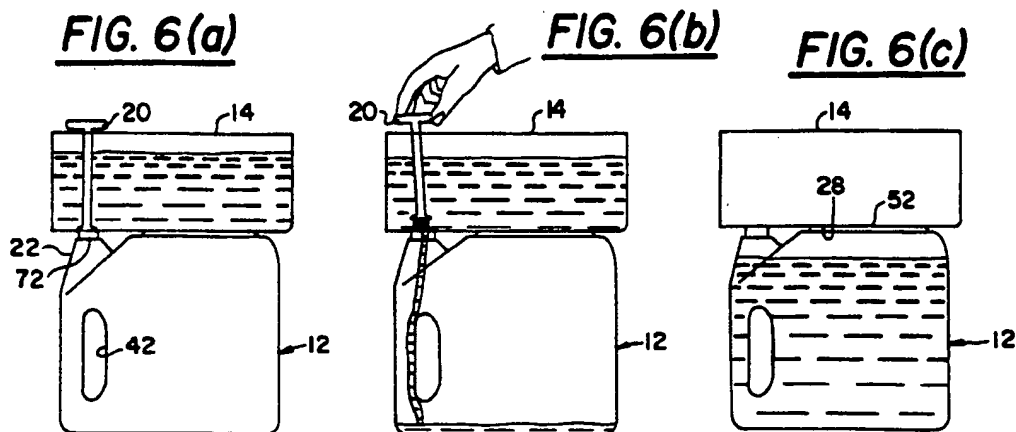
ABSTRACT

A jug for new oil is disclosed having a neck which opens upwards at one end of a flat platform. The jug is provided with a handle slot located below the neck, which tends to reduce rapid variations in pouring rate (i.e. 'glugging') as new oil is poured out. The platform aids in supporting the catch pan as used oil is drained from it through a drain opening, into the emptied jug which had contained the new oil. The catch pan is provided with a plug operated by a T-handle. Also disclosed are a funnel which can be nested in an inverted condition on the jug neck, and a catch pan with a boat-shape to permit over-the-lip pouring of used oil therefrom as an alternative to controlled draining of used oil therefrom through a bottom wall drain.

2 Claims, 3 Drawing Sheets







CONTAINER FOR ENGINE OIL

BACKGROUND OF THE INVENTION

The U.S. Patents of W. J. Pollacco U.S. Pat. Nos. 4,403,692, issued Sep. 13, 1983 and 4,533,042, issued Aug. 6, 1985 and of Paul J. Pollacco (the present inventor) 4,524,866, issued Jun. 25, 1985 disclose several devices which are designed to be used by do-it-yourselfers in changing their automotive engine oil in a convenient, yet socially-responsible manner.

In general, these prior patents disclose kits and parts for use in a procedure in which used oil is drained from the automotive engine crank case into an open catch pan (i.e. a drain pan) slid under the vehicle. After the crankcase outlet plug is closed, new oil is poured from a jug into the filler tube on the engine. Finally, the used oil caught in the catch pan is poured from the catch pan back into the previously emptied new oil jug.

The present invention is directed towards refinements, elaborations and improvements of those kits and parts.

SUMMARY OF THE INVENTION

A jug for new oil is disclosed having a neck which opens upwards at one end of a flat platform. The jug is provided with a handle slot located below the neck, which tends to reduce rapid variations in pouring rate (i.e. 'glugging') as new oil is poured out. The platform aids in supporting the catch pan as used oil is drained from it through a drain opening, into the emptied jug which had contained the new oil. The catch pan is provided with a plug operated by a T-handle. Also disclosed are a funnel which can be nested in an inverted condition on the jug neck, and a catch pan with a boat-shape to permit over-the-lip pouring of used oil therefrom as an alternative to controlled draining of used oil therefrom through a bottom wall drain.

The principles of the invention will be further discussed with reference to the drawings wherein preferred embodiments are shown. The specifics illustrated in the drawings are intended to exemplify, rather than limit, aspects of the invention as defined in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the Drawings

FIG. 1 is an exploded front elevational view of a jug with its cap and funnel, and a used oil catch pan (drain pan) from which the jug has just been denested;

FIG. 2 is an elevational view of the T-handled plug;

FIG. 3 is a left side elevational view of the jug;

FIG. 4 is a right side elevational view thereof;

FIG. 5 is a top plan view thereof;

FIG. 6(a), 6(b) and 6(c) show used oil being poured into the jug of FIGS. 1 and 3-5 from a catch pan having a T-handled plug-type stopper of FIG. 2 for its drain opening.

FIG. 7 shows an alternate form of the kit, in which the pan that the jug is initially nested in has a boat-shaped lip; and

FIG. 8 shows used oil being poured over the lip of the pan into the emptied jug using the denested, inverted and connected funnel.

DETAILED DESCRIPTION

FIG. 1 shows parts of a do-it-yourselfer's oil change kit 10 that includes a new oil jug 12 that denestably nests

in a catch pan 14. Other parts depicted are a cap 16, a funnel 18 and a handle-bearing drain plug 20.

The jug 12 is preferably made by a conventional blow-molding process out of high density polyethylene, although any synthetic plastic resin conventionally used in the manufacture of oil jugs can be used. The other parts likewise may be conventionally molded of plastic, e.g. by plug-assisted vacuum thermoforming, injection molding. The catch pan 14 as an alternative to being made of synthetic plastic resin may be made of molded paper pulp or fabricated of paperboard, much as egg cartons and milk cartons conventionally are, and treated with an oil-proofing agent, such as is used for coating paperboard milk cartons.

The internal perimeter of the catch pan 14 preferably is sized and shaped so that the jug 12 nests in it, oriented as shown, with the cap 16 screwed onto the neck 22 of the jug 12 as a closure for its upwardly-directed mouth 24, with the funnel 18 inverted and nested on the neck 22, and the drain plug 20 trapped between the handle of the jug and the bottom wall of the catch pan 14.

(Because the jug and the catch pan have different orientations at different times it is difficult to designate their features in an unambiguous manner. However, for ease of description, the wall of the jug 12 numbered 26 will be called its bottom, and the wall of the catch pan 14 numbered 28 will be called its bottom.)

The jug 12 is seen to have a bottom 26, front and rear walls 30,32, a top wall 34, a right end wall 36 and a left end wall 38. The bottom, front, rear, top and right walls are all generally flat, with rounded corners, but at the left, the jug is abruptly reduced in thickness to provide a shoulder at 38' from which an integral handle portion 40 projects further to the left. A vertically elongated slot 42 is shown formed through the handle portion 40 intermediate the height and width of the handle portion 40. Accordingly, the interior of the handle portion 40 connects with the body of the jug 12 both above and below the handle slot 42, and the handle slot 42 permits the user to get a convenient grip on the handle 44 defined between the slot 42 and the outer end 46 of the handle portion 40. The communication channel in the jug interior at 48 under the handle slot and within the handle preferably is between one and two inches in transverse cross-sectional area, for a new oil jug of 4-5 quart capacity, which are the sizes presently contemplated.

The neck 22 of the jug 12 projects upwards from the handle portion, and from an angled transitional region 50 of the jug body top wall so that its upwardly open mouth 24 is disposed no higher than and preferably a little lower than the large flat platform 52 provided by the top wall 34. The neck 22 is shown having a band of external threading 54 integrally formed thereon adjacent the mouth 24, so that the cap 16 may be screwed in place for openably closing the mouth. (A frangible wafer seal (not shown) e.g. of plastic/metal foil laminate, may be applied to the mouth of the jug for sealing it closed, against leakage or adulteration, when the jug is initially filled with new oil, as has recently become conventional for jugs of new oil.)

The funnel 18 has a generally conically tapered body 56 with an open mouth 58 at its larger end, and a neck 60 which protrudes axially from the smaller end of the body of the funnel. The end 62 of the funnel neck is open, at least when the funnel is made ready for use. However, when the kit is made-up, the funnel 18 is inverted and telescopically nested on the neck of the

capped jug of new oil, prior to nesting that jug in the catch pan 14. The funnel 18 may be frictionally held in place, and/or adhesive tape, a dab of adhesive or a shrink-wrap of plastic film or other wrapper about the funnel-bearing jug neck and/or about the whole kit may be provided as a sufficient means for keeping these kit parts assembled until they are to be disassembled for use.

It should be apparent that the flare on the funnel body internal surface matches the taper on the jug neck, and the internal surface of the spout of the funnel matches the external generally cylindrical nature of the capped mouth of the jug.

The catch pan 14 is generally rectangular; in addition to its bottom wall 28, it has four upstanding sidewalls 64, rounded edges and corners, and a lip 66 perimetricaly surrounding and defining its open mouth 68. In the floor 28 there is shown provided a drain hole 70 with a neck 72 that projects outwardly a short distance, e.g. about one-fourth to three-fourths of an inch. The external diameter of the drain neck 72 is such as will permit the neck to telescopically fit into or sealingly snugly telescopically fit around the open neck of the jug 12 at the jug mouth. In the instance depicted, the drain neck is internally threaded as at 74 for threaded receipt of the drain plug 20 to provide a controllably openable closure for the drain hole 70. However, as an alternative, the drain hole 70 could be provided with a non-replaceable frangible closure of the type designed to be pierced or tab-pulled away, as shown in the above-mentioned U.S. patent of P. J. Pollacco.

The preferred closure, as shown, is an externally-threaded drain plug 20, provided with a turnable handle, e.g. a T-handle 76 that is sufficiently long that when the closure is in place in the hole 70 with the handle projecting upwards, the catch pan is slid on its bottom under an automobile crank case and the crank case oil drain outlet is opened allowing used oil to drain from the automobile into the pan 14, by the time the crank case is finished draining of used oil, the handle 76 still projects to a sufficient degree above the level of the used oil as to permit it to be grasped and turned by hand sufficiently to open the drain.

Accordingly, after the used oil has been collected in the catch pan 14, the drain valve on the automotive crank case (not shown) is closed, the funnel 18 is removed from the neck 22 of the jug 12 of new oil and the funnel neck 60 is inserted in the open upper end of the engine oil filler pipe (not shown) of the automobile. The cap 16 is then unscrewed from the neck 22 of the jug 12 and its mouth 24 opened (if it is closed by a conventional frangible wafer seal, not shown), whereupon the new oil may be poured from the jug 12 through the funnel 18, into the sump of the engine. For reasons unknown to the present inventor, as the jug 12 is tilted to pour oil from its neck 22 so that the handle 44 which was at the left become lower, the magnitude of 'glugging' of oil from the jug, i.e. sudden, strong variations in the volume of oil being dispensed per unit time, is substantially reduced in comparison with otherwise similar jugs, having their handles located along the top or along the side opposite from the spout.

When the jug 12 is thus emptied of new oil it is set down on its bottom wall 26, and the funnel is removed from the engine oil filler tube (not shown) and discarded or salvaged for a next use. The catch pan of used oil is slidingly retrieved from under the automobile and placed onto the emptied new oil jug 12 so that the drain

neck 72 is slightly telescoped into the neck 22 of the jug 12 and the bulk of catch pan 14 rests via its bottom wall 28 on the platform 52 of the top wall of the jug 12.

Next the handle 76 is moved in a sense to loosen the plug 20 sufficiently as to let the used oil drain from the catch pan 14, through the drain hole 70, and into the jug 12 according to the progression of events depicted in FIGS. 6a, 6b, and 6c. Where the plug 20 is externally threaded, as at 78, the handle can simply be turned in an unscrewing sense. Usually, and especially if the threads 74 and/or the threads 78 are locally discontinuous spirally of the respective surface on which they are provided, complete unscrewing of the plug 20 is unnecessary. (It is thought to be advantageous to screw the plug 20 only part-way out, so that if all is not going well, or the do-it-yourselfer has to turn his or her attention from the project for a little while, e.g. because the phone has rung or a visitor has arrived, there is no need to fumble around trying to re-stopper the drain hole 70. Rather, the handle 76 need simply be turned in a plug screwing-in sense to turn off the flow. Actually, generally there is no need for the do-it-yourselfer to observe this draining procedure, because nothing is likely to go wrong, and there is plenty of room in the jug 12 for the oil draining from the pan 14. However, in informal surveys conducted thus far, consumers have seemed to like this ability to interrupt the flow.)

After the used oil has drained from the pan 14 into the jug 12, the pan 14 is lifted away and the jug reclosed using the cap 16. The pan 14 may be discarded, or salvaged for the next use. The jug 12, now filled with used oil and capped, can be taken conveniently to an oil recycling center.

Rather than purchase an entire kit 10, a do-it-yourselfer could purchase a pan 14, and use it with his or her own separately acquired funnel and jug of new oil. Or, he or she could buy a jug of new oil, with or without the funnel, and use it with a catch pan 14 salvaged and saved from the last time he or she changed their automotive engine oil.

Shown in FIGS. 7 and 8 is a further embodiment which, though it may be less preferred in many instances, yet provides a practical way of putting some important principles of the present invention into use.

There are some oil companies or packagers which have so much money invested in their particular designs of jugs for new oil, that the present inventor has found them to be extremely reluctant to adopt a drain pan/new oil jug kit system such as is explained above with reference to FIGS. 1-6c, since that would entail too large an investment, from their viewpoint, in tooling for a jug 12 with a platform 52 for the pan 14 to rest on while draining used oil into the jug. And they may also be reluctant to go to the expense of tooling for a catch pan 14 with a closed, openable drain 70. The kit embodiment 90 is designed with such economics in mind, as a lower cost way of providing do-it-yourselfers with a socially responsible way of changing their engine oil.

The kit 90 is shown including an existing, popular shape jug of new oil 92 having a generally flat bottom wall 94, a peripheral sidewall 96, a generally conical top wall 98 offset towards one side where it terminates upwardly in neck 100 having an externally threaded band 102 for removably receiving a closure cap (not shown, but like the cap 16). This neck 100 happens to have an axially short externally smooth, cylindrical band 104 extending above its threading 102.

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The slotted handle 106 is provided crosswise through the top wall of the jug 92, as shown.

The catch pan 108 has a bottom wall 110, and upstanding peripheral sidewalls 112 which give the catch pan generally a boat shape as seen in plan, i.e. with a 'stern' at 114 and a 'bow' at 116. (Of course in this instance the apex of the bow is located off to one side; in fact it is coincident with the left sidewall in the instance depicted, but that is because the neck of the jug is similarly displaced towards one side of the jug. For jugs with a centrally located neck, the catch pan would have its apex along its centerline as well.) A funnel 118 is telescopically nested on the jug neck in an inverted condition and held there in any convenient way (such as is described above in relation to the funnel 18). The closed jug of new oil 92, with its funnel 118 invertedly nested on its neck is nested in the open top of the pan 108. These parts may be kept assembled, as shown, until needed simply by gravity, or by a shrink-wrap sleeve of plastic film (not shown) or an enclosing container of paperboard (not shown) or in any other convenient manner.

At the time of use, the kit 90 is disassembled into its parts: the jug of new oil, the funnel 118 and the catch pan 108. The catch pan 108 is slid under the automobile and used oil is drained into it from the engine crank case. The crank case drain outlet is closed and the jug 92 of new oil is uncapped. The funnel 118 may be used as the new oil is poured from the jug 92 into the sump of the engine through the engine oil filler tube of the engine (not shown).

As with the first embodiment, the open, emptied jug 92 is then set down on its flat bottom 94. But now the method of use diverges from that of the first embodiment. The funnel 118 is retrieved and the open lower end portion of its spout 120 is telescopically joined with the non-threaded band 104 on the jug neck. (The fit is so snug no oil can leak, even though the spout telescopically surrounds the band 104.) Next, the pan of used oil is slid out from under the automobile, and the used oil is poured over the apex 122 of the lip 124 of the pan, through the open mouth of the funnel 118, into the

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emptied jug 92. When the pan 108 is thus emptied and the jug 92 is thus filled with used oil, the pan 108 is discarded or salvaged, as is the funnel 118, the jug 92 is recapped with its original cap and the thus-closed container of used oil may be conveniently taken to an oil recycling center.

As with the first embodiment, the parts 92, 108 and 118 could be sold separately, for use together.

It should now be apparent that the do-it-yourself automotive oil change devices as described hereinabove, possesses each of the attributes set forth in the specification under the heading "Summary of the Invention" hereinbefore. Because it can be modified to some extent without departing from the principles thereof as they have been outlined and explained in this specification, the present invention should be understood as encompassing all such modifications as are within the spirit and scope of the following claims.

What is claimed is:

1. A jug, having:

a bottom wall, a set of upstanding sidewalls and a top wall, providing a jug body, and a neck which projects outwardly from the body, this neck terminating in a mouth through which contents may be poured from the jug, and a closure adapted to removably close that mouth, said neck having an upwardly-tapering generally conical lower portion adjoining a generally cylindrical upper portion; and

said jug neck is offset to one side of said jug body over a handle portion that is internally communicated with but thinner than said jug body; there being means defining a generally vertically elongated handle slot provided through the thickness of said handle portion of said jug under said jug neck.

2. The jug of claim 1, wherein:

said jug includes an upwardly facing, generally horizontal platform on said top wall thereof for removably supporting a catch pan as such catch pan is being drained into said jug through said neck.

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United States Patent [19]
Bortolani et al.

[11] **Patent Number:** 5,076,436
[45] **Date of Patent:** Dec. 31, 1991

[54] **VACUUM PACKAGING**

[75] **Inventors:** Ermanno Bortolani, Milan, Italy;
Enzo Vassarotti, Rolle, Switzerland

[73] **Assignee:** W. R. Grace & Co.-Conn., Duncan,
S.C.

[21] **Appl. No.:** 536,047

[22] **Filed:** Jun. 11, 1990

Related U.S. Application Data

[60] Continuation of Ser. No. 320,739, Mar. 8, 1989, abandoned, which is a division of Ser. No. 551,373, Nov. 10, 1983, Pat. No. 4,833,862.

[30] **Foreign Application Priority Data**

Nov. 15, 1982 [IT] Italy 24264 A/82

[51] **Int. Cl.⁵** B65D 81/20; B65B 11/52

[52] **U.S. Cl.** 206/524.8; 53/427;
53/433; 53/509; 206/497; 426/125; 426/396

[58] **Field of Search** 426/125, 129, 396;
229/25 R; 206/471, 497, 524.8; 53/427, 432,
433, 453, 509, 511, 440; 220/306, 359, 258

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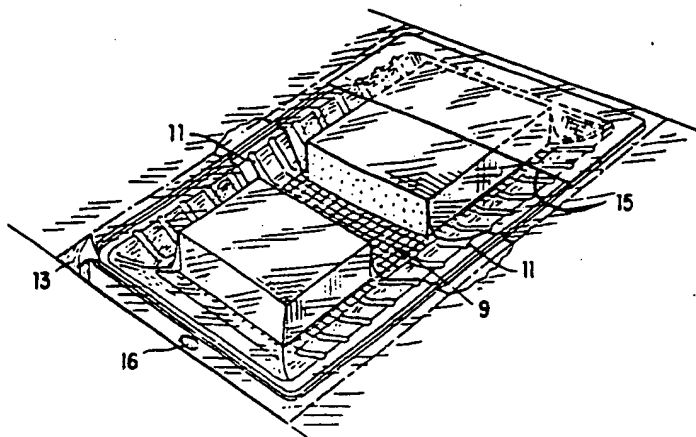
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Primary Examiner—Bryon P. Gehman
Attorney, Agent, or Firm—William D. Lee, Jr.; Mark B. Quatt; Jennifer L. Skord

[57] **ABSTRACT**

In a vacuum skin package wrinkles and weak spots are avoided by providing a tray as the support or backing member rather than a flat sheet, the angle of the walls as they diverge outwardly being 91° to 160°. Especially useful is such a package when provided with a lid for stacking purposes.

1 Claim, 2 Drawing Sheets



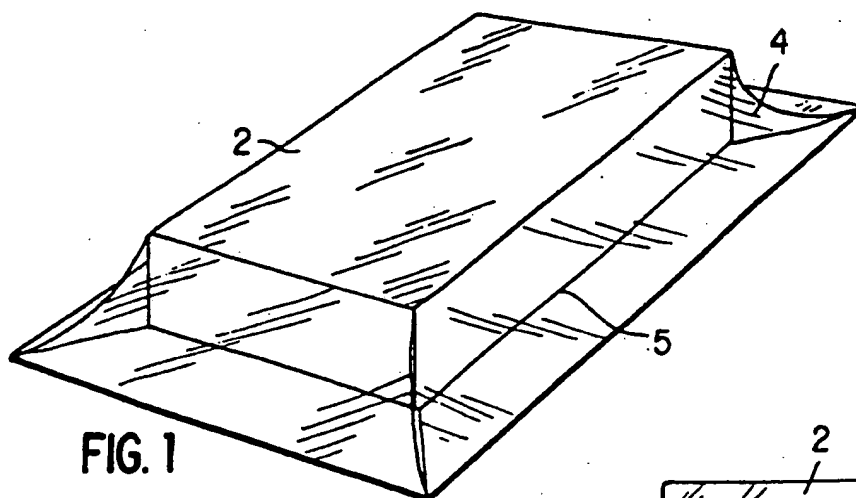


FIG. 1

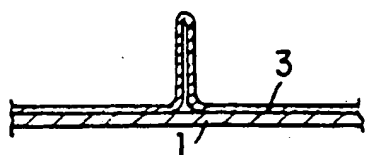


FIG. 3

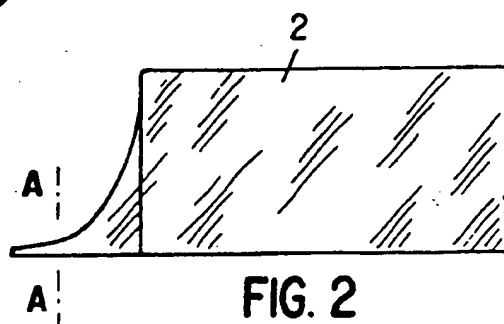


FIG. 2

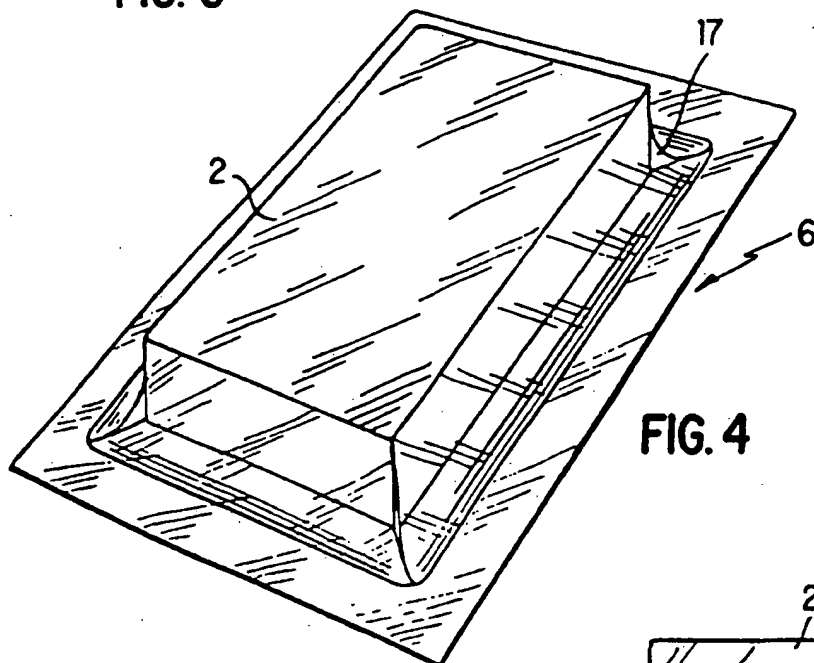


FIG. 4

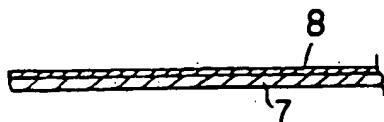


FIG. 6

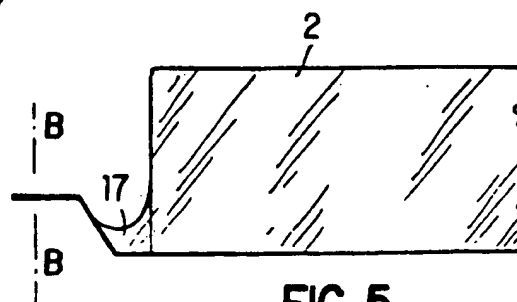


FIG. 5

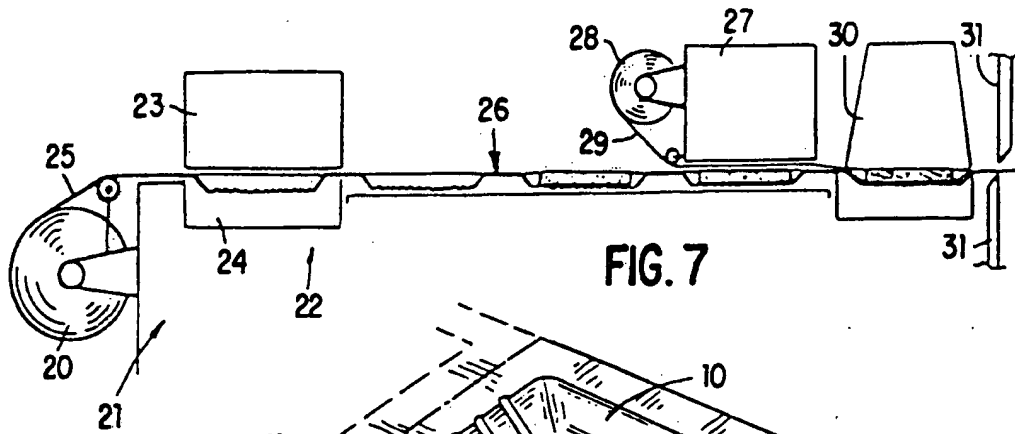


FIG. 7

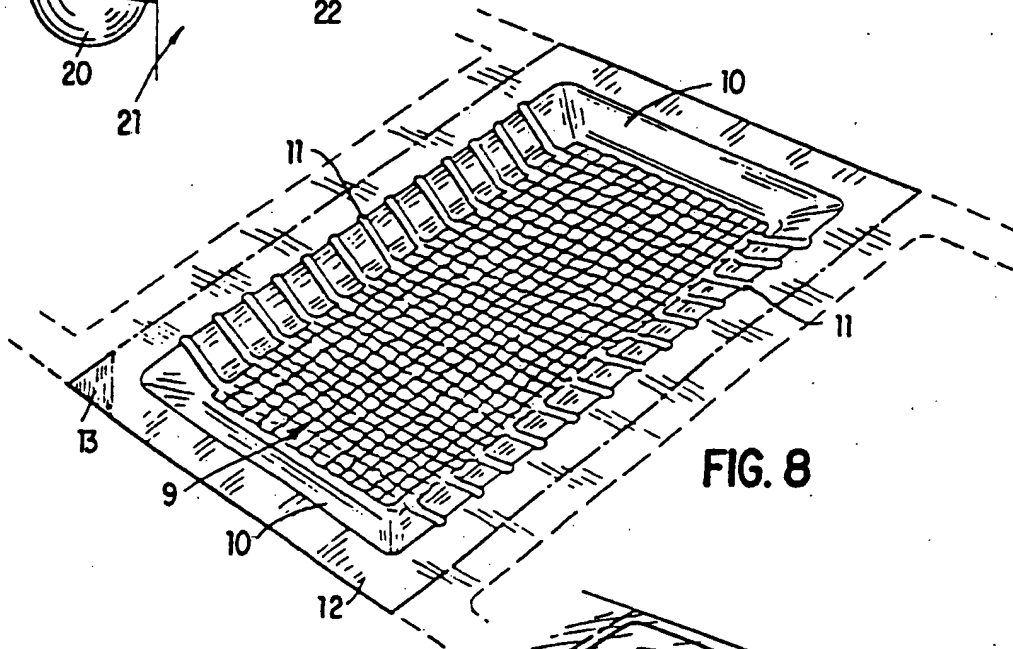


FIG. 8

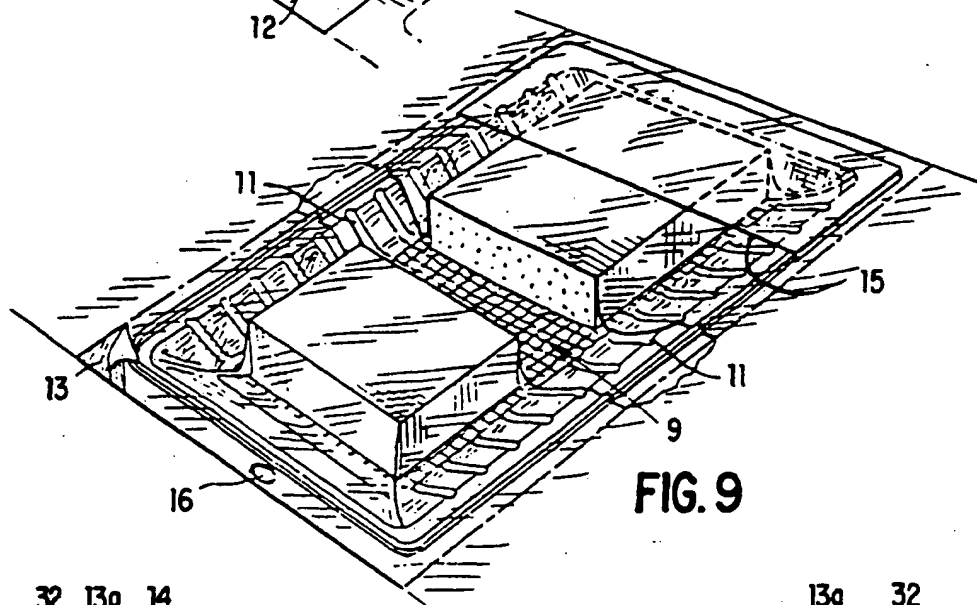


FIG. 9

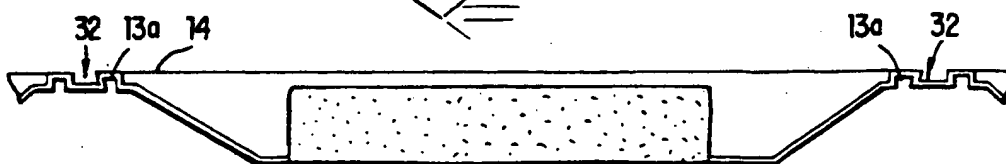


FIG. 10

VACUUM PACKAGING

This application is a continuation of application Ser. No. 320,739 filed on Mar. 8, 1989, now abandoned, which is a division of U.S. Pat. No. 4,833,862 issued on May 30, 1989.

FIELD OF INVENTION

This invention relates to a method and an apparatus for vacuum packaging, particularly for packaging food products in skin packages.

BACKGROUND

Known are several methods for imparting special characteristics to vacuum packages for food products; as an example, U.S. Pat. No. 3,792,181 which issued on Feb. 12, 1974 to Reid A. Mahaffy et al. discloses a container of a semirigid plastic material shaped to accommodate a detachable lid.

This prior container, while affording definite advantages, requires a shape as close and as similar as possible to the shape and dimensions of the product to be placed therein and thus it lacks desired versatility. An improvement on this packaging technique has been achieved by arranging articles to be packaged onto a supporting sheet-like material, which is then covered with a polymeric film; and thereafter, the volume included between the film, sheet-like material, and product is sealed by application of a pneumatic vacuum.

Such approaches, e.g., as described in U.S. Pat. No. 3,694,991 which issued Oct. 3, 1972 to Richard R. Perdue et al. need improvement as regards loading of the products into the package supporting sheet number, because its arrangement on such a sheet-like material prevents the product from being directly and definitively seated, and there may occur instances of improper arrangement of articles inside the packages.

Another problem, pointed out in detail in Italian Patent Application 21030 A/82 filed Apr. 30, 1982 by W. R. Grace & Co. (E. Bartolani et al., inventors) arises from the formation of folds in the film, especially along the vertical corners of the product being packaged.

The problem is further aggravated where, as is usual, the products to be packaged are arranged side-by-side on a web of sheet-like material for simultaneous packaging of several products preliminarily to subsequent severing of the sheet-like material to separate the individual packages.

In that case, on account of the cited folds spanning considerable distances, it often occurs that the sheet-like material is severed at areas affected by said folds, thus causing air to seep into the packages.

It should be also considered that the upper film has areas particularly weakened in the proximities of the areas of connection to the sheet-like material, which are due to the high stretch to which the film is subjected during the packaging step.

In the light of the foregoing technical problems, it is a primary object of this invention to remove such prior drawbacks by providing a method of vacuum packaging which can eliminate the dimensional dependence of the container on the product it must accommodate.

Another important object of the invention is to provide a method which can combine good aesthetic characteristics with ease of loading the product during the packaging step, attenuation of the folds in the upper film with full elimination of their damaging effect and con-

siderable strengthening of the package, which is apt to facilitate its handling and avoid deformation of the package under the action of the applied vacuum.

A further object of the invention is to provide an apparatus to implement the above method.

It is another object of this invention to provide a vacuum package having no voids in its interior.

In addition, an object of the invention is to provide a vacuum package with enhanced properties of presentation and outward appeal of the packaged product.

Yet another object of this invention is to provide a vacuum package of low cost and great convenience, and, above all, one combining all of the advantages set forth hereinabove.

SUMMARY OF THE INVENTION

The above and other objects are achieved by a method and apparatus for vacuum packaging comprising the steps of placing at least one product article onto a supporting sheet-like material and covering said product article with a film sealed on said supporting sheet-like material by the application of a pneumatic vacuum around the article or product articles and between the supporting sheet-like material and said film, characterized in that it comprises the step of thermoforming said supporting sheet-like material to impart a substantially tray-like configuration thereto with raised peripheral edges. The raised edges may be upwardly diverging walls. The invention also comprises the product produced by either said method or apparatus.

DESCRIPTION OF THE DRAWINGS

Further features and advantages of the invention will be more clearly understood from the following description of a preferred but not limitative embodiment of this apparatus for vacuum packaging and of a package obtained with said apparatus, with reference to the accompanying illustrative drawings, where:

FIGS. 1 to 3 show a perspective view, side elevation view, and sectional view taken in the plane A—A of the fold illustrated in FIG. 2, respectively, with reference to a conventional vacuum package;

FIGS. 4 to 6 show similar views of an inventive vacuum package, among which a sectional view taken in the plane B—B;

FIG. 7 schematically illustrates the apparatus according to the invention;

FIG. 8 is a perspective view of the shape taken by the supporting sheet-like material following the thermoforming step;

FIG. 9 shows a perspective view, partly in section, of a completed vacuum package; and

FIG. 10 is a cross-sectional view of the inventive vacuum package, with a protective lid applied thereon.

DETAILED DESCRIPTION

Making reference to FIGS. 1 to 3, some of the problems encountered in conventional vacuum skin packages may be observed, for example in a vacuum package as shown in the abovementioned U.S. Pat. No. 3,694,991.

Such packages generally comprise a supporting sheet-like material 1 whereon a product 2 to be packaged is deposited.

The whole assembly is then covered with a film 3 which is sealed to the sheet-like material, and a high negative pressure is created there-within such that the package is practically in a vacuumed condition.

Along the corner edges, the excess film 3 is gathered into folds 4 which extend over a certain length across the sheet-like material. Now, considering that a packaging line operates with a number of products arranged parallel to one another and after enclosure, the product containing packages are subsequently severed from one another by means of a cutter, it will be apparent that, if the cut area includes a fold portion, such as shown by the dash-line A—A in FIG. 2, the section whereof is represented in FIG. 3, then there may occur air seepage into the package, with attendant deterioration of the preserving properties which characterize this type of packaging.

In actual practice, it has been found that said occurrence is more apparent in the lateral products of a packaging web, it being presumed that the folds can be better accommodated if a side-by-side product arrangement is used.

From the above mentioned patent application 21030 A/82 it is in fact evident that to solve the problem a "dummy product" element arranged along the edges of the sheet-like material web is utilized.

Conventional packages, moreover, have a marginal or peripheral area of significant weakening of the upper film 3 at margin 5 as indicated in FIG. 1. This area approximately corresponds or follows the perimeter of the area of contact between the sealed film-product assembly 2 and the sheet-like material.

This area 5 is in fact subjected to maximum plastic deformation during the application steps, and accordingly grows thinner to the point of constituting a critical element in the whole package.

During handling and shipping, in fact, contacts and impacts may occur between packages, which, when affecting the area 5, can result in damage to the packaged product.

FIG. 4 shows a vacuum package according to the invention which is generally indicated at 6.

It also comprises a supporting sheet-like material 7 on which a product-article 2 is arranged, which is wrapped across its surfaces not contacting the sheet-like material, in a polymeric film 8 which is sealed to the supporting sheet-like material by the application of a pneumatic vacuum around the article or product-articles and between the supporting sheet-like material and the film.

According to the invention, the supporting sheet-like material has a substantially tray-like configuration defining a bottom 9 from which walls 10 extend which diverge on the opposite side to the bottom.

It has been found that the values for the angles included between the bottom 9 of the tray and diverging walls 10 should be advantageously selected in the 91° to 160° range, preferably in the 105° to 150° range: this affords, among others, an optimum configuration, both as regards sealing and the mutual arrangement of the contacting tray and film parts.

The bottom 9 has, preferably, an undulated surface which defines a plurality of canals or microchannels intersecting one another to facilitate the extraction of air during the sealing operation; additional canals are defined by grooves 11, extending substantially parallel to one another toward the bottom such as to communicate to said microchannels, again to facilitate the extraction of air.

The supporting sheet-like material preferably comprises a multilayered laminated film having flexibility characteristics which vary according to the product to be packaged and package type.

In accordance with this invention, the upper film 8 is caused to adhere on almost all the surfaces of said product articles not directly in contact with the tray-like sheet-like material such as to provide a smooth sealed cover without voids. The film also adheres on the bottom, walls, and border 12 carried peripherally on the cited walls and substantially parallel to the bottom 9.

The absolute absence of voids within the package avoids, among others, such problems as sucking out liquids in relation with product articles, such as meat, and consequent flowing of such liquids into the package itself.

Also provided is the application along at least a portion of the border 12 extension and preferably at a corner of a non-sticking tab 13 which creates an area of non-adhesion between the upper film and sheet-like material to facilitate film gripping as the package is being opened.

In a preferred embodiment, the border 12 has, along at least a portion of its extension, an engagement element 13a, e.g., in the form of a peripheral raised portion, with which a corresponding engagement element 14 may be engaged which is carried on a lid 15 which may be associated with the tray subsequently to the vacuum sealing operations.

The lid affords for the package of this invention the added advantage of enabling it to be closed after the upper film has been removed, which advantage is particularly appreciated where the tray element contains products which are not intended for consumption all at once and for which the inventive package allows the original package to be retained for conservation even during the intermediate consumption stages. The lid, moreover, protects the vacuum package during transportation and advantageously facilitates stacking.

A possible embodiment of the package according to this invention provides for a hole 16 in the border 12 which enables the retailer to suspend the packages from suitable display structures, thus favoring the visual impact of the product on the customer.

As illustrated in FIGS. 10 and 5, the sloping walls 10 and border 12 afford a significant reduction in the folds 17 and cause said folds to remain at all times within the inside perimeter of the border, eliminating almost completely those dangers which they presented in conventional packages.

Adhesion of the film 8 on the sheet-like material 7 and the folds 17 themselves define, moreover, a strengthening structure for the package, and in particular the folds 17 behave as stiffening ribs for the tray element. The implementation, according to the invention, of all that has been described affords a high vacuum package rating as regards the presentation and outward appearance aspects of the package, thus enhancing the appearance of the packaged product-article.

In FIG. 7, there is shown an apparatus according to the invention, which comprises a first reel 20, on which is wound the supporting sheet-like material and which is carried rotatably on a bed 21.

Associated with the bed is a thermoforming station 22, preferably comprising a heater element 23 facing a mold element 24 such as to leave between said elements a gap for the passage of the sheet-like material 25.

Both the cited elements are connected to a vacuum source or pump, not shown because of conventional design, and have means for sucking the sheet-like material against either of the surfaces facing it.

Directly downstream of the thermoforming station, on the opposite side to the coil 20, the apparatus has a portion 26 for loading products to be packaged onto the sheet-like material. Downstream of the portion 26, the bed 21 carries a packaging station 27 which carries rotatably a second reel 28 around which the polymeric film 29 is wound.

Within the station 27, the product-sheet-like material assembly is brought to an evacuated condition and sealed by means of the film 29 with a conventional method described in said Italian Patent Application 21030 A/82.

Where it is desired to apply on the package an additional lid 15, as shown in FIG. 9, an applicator of lids 30 of conventional design would be provided downstream of the station 27.

Since in actual practice the width of the sheet-like material is such as to permit the forming of several tray-like elements parallel to one another, the station 27, or possible the assembly 30, is followed by cutting members 31, which subdivide the sealed package web exiting the apparatus into individual packages for subsequent sale.

The operation of the inventive apparatus will be apparent from the foregoing description and accompanying drawings, and is illustrated for further clarification of the functional aspects of the stations which compose it and of the method of packaging under vacuum which said apparatus implement.

The reel 20 supplies sheet-like material to the various assemblies and stations arranged sequentially along the path of the material itself.

The first station supplied is the thermoforming station, wherein the sheet-like material takes on a permanent deformation of a substantially tray-like configuration with raised edges as shown in FIG. 8.

To achieve said deformation, initially the heater element draws the film of sheet-like material, e.g., multi-layered polymeric film, against the surface of the heater element facing said material.

During this step, the material 25 is heated, e.g. by electric resistor heaters contained in the element 23 to acquire adequate plastic properties. Upon achieving this object, suction is discontinued on the element 23 side, and suction is started on the mold element 24 side, such that the hot sheet-like material can reproduce the shape of the mold element, and, in contacting the cold surface, be restored to its initial rigidity.

It is accordingly necessary to arrange for the feeding of the sheet-like material 25 to occur intermittently, which does not hinder the correct operation of the machine because the same type of feed is required by the station 27.

Of course, the thermoforming operation may be carried out by means of any other suitable method which can lead, as the final result, to a permanent deformation of the sheet-like element in accordance with the tray-like configuration described above. Merely as an example, among the prior methods, are those methods using cooperating mold and die systems, whether of the mechanical or fluid dynamic types.

Along the portion 26, the products to be packaged are arranged into the tray-like configured elements, with an evident practical advantage over conventional machines because this allows an accurate positioning of the products and not the chance arrangement possibly identified by detents on the bed 21.

More evident is the advantage over prior thermoformed packages because the tray-like configuration is adapted to accommodate products with different shapes

and dimensions without requiring modification of the mold element.

The tray/product assemblies thus reach the packaging station 27 where, in a known manner, they are vacuum sealed through application of the film 29.

Where application of the lids 15 is provided, the mold element 24 pre-arranges the tray elements forming the engagement elements 13a along portions or possibly along the entire perimeter of the border 12 to allow the assembly 30 to correctly install the cited lids.

Since, as previously set forth, the tray elements and consequently the sealed packages exit the station 27 in the form of a continuous web having a plurality of mutually parallel packages as illustrated in FIG. 8, the cutting members 31 provide for the separation of the individual packages e.g. at the portion indicated by arrows 32 in FIG. 10.

It has been ascertained in practice that the apparatus so described can easily bring about significant improvements to the vacuum packaging methods known heretofore, with simplicity and rationality without requiring significant modification to conventional machines and hence with considerable economy of production.

The invention so conceived is susceptible to many modifications and variations all of which fall within the scope of the inventive concept. Moreover, all of the details may be replaced with other technically equivalent elements.

In practice the materials employed and the dimensions may be any ones, depending on requirements and the state of the art.

We claim:

1. A package prepared by using a vacuum skin packaging process comprising:

- a) a thermoformed tray having a substantially flat bottom with outwardly diverging walls extending upwardly from said bottom, the angle included between said walls and said bottom being between 105° to 150°, said tray being constructed from a thermoformable polymeric material and the walls and bottom of said tray being of one continuous, uncut material;
- b) a product positioned on the tray bottom, said product being spaced apart from the walls so that there is a peripheral area of the tray bottom around the product which is not covered by the product in order to permit the sealing of a covering film to the tray bottom around the periphery of the product thereby permitting viewing of the side of the product without obstruction from the tray walls, said product being lower in height than said tray walls;
- c) a border around the upper margins of the outwardly diverging walls, said border being substantially parallel to the tray bottom;
- d) a covering film of transparent, polymeric film very closely conforming to the shape of the product in a skinlike fashion, said film being sealed to the tray bottom around the periphery of the product and onto and at least partially up the diverging walls whereby said film is formed around the product on the tray bottom;
- e) a lid engaging said border and being spaced apart from the product, said lid engaging said border and being supported thereby;
- f) the space which contains said product and which is bounded by said covering web and said tray bottom being substantially evacuated having been evacuated through application of a vacuum skin packaging process.

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United States Patent
Saltzer, Sr.

[15] 3,696,580

[45] Oct. 10, 1972

[54] **SHRINK FILM PACKAGING METHOD**

[72] Inventor: **Joseph M. Saltzer, Sr.**, 10775 69th Avenue North, Osseo, Minn. 55369

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[51] Int. Cl. **B65b 43/02**

[58] Field of Search **53/27, 30; 206/46 FR, 65 S**

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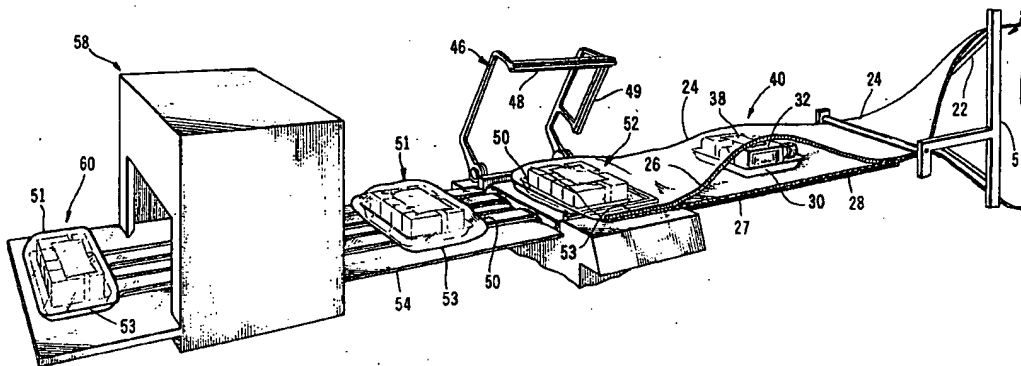
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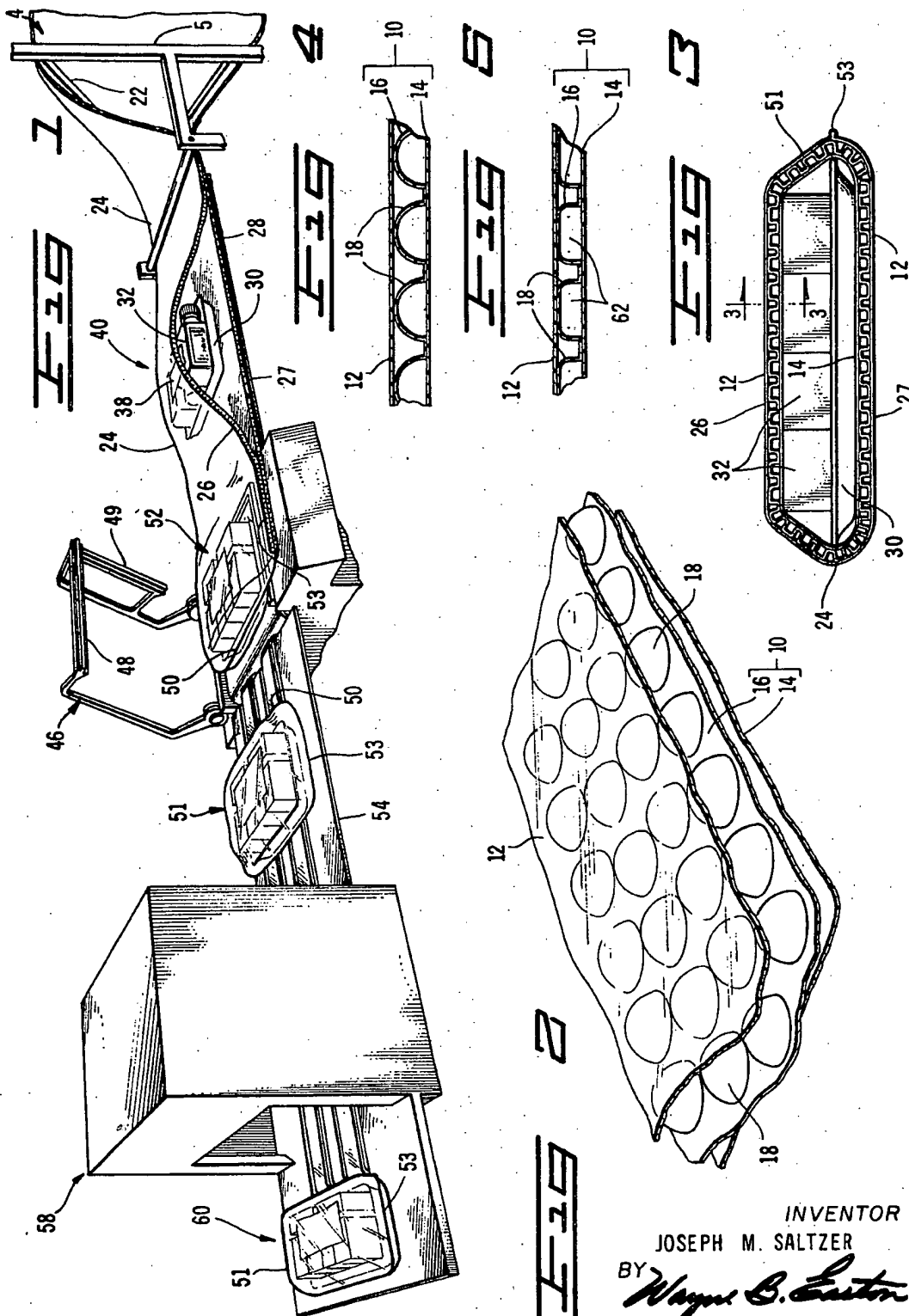
Primary Examiner—Travis S. McGehee
Attorney—Wayne B. Easton

[57] **ABSTRACT**

The invention relates to a shrink film packaging method by which articles intended for shipment by common carrier or to be sent through the mail may be wrapped so as to be protected from the usual and normal effects of handling. Articles to be wrapped are loaded onto a cardboard or plastic tray which is placed between the folds of two layers of material. The inner layer of material surrounding the tray and articles thereon is a special cushioning material which comprises closely spaced air bubbles formed by two sheets of polyethylene with air pockets formed therebetween. The outer layer of material is a shrink film and a sealer is utilized to form sealed edges around the tray and articles to form a package. The excess wrapping material is trimmed simultaneously as it is being sealed and the package is directed to a heat tunnel where the heat causes shrinkage of the outer shrink film which in turn causes the air in at least some of the bubbles of the inner material to be compressed to a pressure greater than atmospheric pressure.

2 Claims, 5 Drawing Figures





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SHRINK FILM PACKAGING METHOD

The invention relates to a new and improved shrink packaging method.

The overwrapping of consumer and industrial products with transparent flexible materials such as cellophane has been a standard packaging technique for many years. In recent years a shrinkable film overwrapping has been developed which is formed and sealed around an article or product. The product with the film overwrapping is then passed through a hot air tunnel and, upon exposure to heated air in the tunnel, the film shrinks to the configuration of the article or product.

The shrinkable film is a thermoplastic film which has been stretched in the manufacturing process. This stretching is called orientation and imparts toughness and a high initial tear resistance to the film. It also gives the film a high gloss and the ability to shrink as much as eighty percent when heated.

Articles or products which are boxed, trayed, banded, bundled, carded or even totally unsupported can all be packaged in shrinkable films. The shrink film alone, however, does not provide a high degree of protection from mechanical forces to which a wrapped article is subjected by handling during the shipping or mailing thereof. In the present invention shrink film is utilized for wrapping an article but a cushioning material is provided between the shrink film and the article. In this respect it will be understood that the method of the present invention is utilized in nature in that it is directed to a protective wrapping method for packaging articles which are to be shipped by common carriers or to be sent through the mails.

The cushioning material utilized is referred to herein as a multiple air bubble material or layer. This air bubble layer comprises two polyethylene sheets bonded together with one sheet being a planar base sheet and the other sheet being a bubble sheet embossed or formed with multiple, spaced apart, generally semi-spherically shaped recesses. The nonrecessed portions of the bubble sheet are laminated to the base sheet with air being present in the enclosed pockets thus formed between the two sheets. This cushioning material is sold in sheet form by the Sealed Air Corporation, Fair Lawn, New Jersey, under the trademark AIR CAP. This material will at times be referred to herein as air bubble cushioning material.

A main object of the invention is to provide a new and improved shrink film packaging method for the protective wrapping of articles to be shipped by common carriers or to be sent through the mails.

Other objects and advantages of the invention will become apparent from the following specification, drawings and appended claims.

In the drawings:

FIG. 1 is a perspective view of an assembly line, somewhat schematically illustrated for packaging articles in accordance with the method of the present invention;

FIG. 2 is a perspective view showing the multiple air bubble cushioning material used with the method of the present invention;

FIG. 3 is a sectional view through a package assembled in accordance with the invention but because of the smallness of the scale no attempt is made to in-

dicating whether the package has been subjected to heat in the shrink tunnel;

FIG. 4 is a sectional view taken on line 3—3 of FIG. 3 prior to the time the package is subjected to heat treatment in the shrink tunnel; and

FIG. 5 is a sectional view taken on line 3—3 of FIG. 3 after the package has been subjected to heat treatment in the shrink tunnel.

Referring to FIG. 1, the assembly line for the packaging method starts with a known type of folding apparatus 4 having vertically extending center folder 5. Two rolls of sheet material precede the center folder 5 but the rolls themselves are not shown. The two sheet materials contained respectively on the two rolls are (1) a multiple air bubble cushioning material 10 and (2) a shrink film material 12. The multiple air bubble cushioning material is a development of the Sealed Air Corporation of Fair Lawn, New Jersey and is sold under the trademark AIR CAP. The AIR CAP material 10 comprises two layers of plastic material as shown in each of the figures of the drawing which are a flat base layer 14 and a tent sheet layer 16 which forms, with the base layer 14, a network of spaced apart "tents" or air bubbles 18. Normally the portions of the tent sheet material which form the bubbles are in a relatively slack condition such that the air of the bubbles does not distend or make the material taut. The application of an external squeezing force to the bubbles 18 causes compression of the air in the bubbles to a pressure somewhat above atmospheric pressure and does cause the plastic material of the bubbles to assume a state of tautness. FIG. 2 also shows a fragmentary portion of shrink material 12 in overlaying relation to the multiple air bubble material which consists of the sheets 14 and 16.

The rolls of material (not shown) are unrolled together to form a continuous two layer strip of material which consists of the shrink film layer 12 and the multiple air bubble layer 10 which consists of the sheets 14 and 16. The two layers of material are brought together from the rolls with the sheet 16 being between the sheets 14 and 12 as is best shown in FIGS. 4 and 5 of the drawing.

The center folding unit 5 is made of any suitable material and has the form of a bulkhead with a V-shaped snout 22 which forms a crease 24 for the center fold of the two layers 10 and 12 of material passing over the snout 22. The folder unit 5 folds the two layers 10 and 12 in half to form upper and lower halves 26 and 27. The feeding of the folded layers of material onto a horizontal support or conveyor 28 is arranged so that the opposite halves 26 and 27 of the base sheet 14, which are on opposite sides of the center crease or fold 24, are in adjacent relation to each other and the shrink film half 27 is in contact with the support 28.

A tray 30 made of cardboard or the like is loaded or has placed thereon one or more articles 32 which are to be packaged. The loaded tray 30 is placed between the opposite halves 26 and 27 of the folded two layer strip of material as close to the center crease 24 as practical. Although it may be redundant, it is specifically pointed out in the interest of clarity that material layer 14 is in contact with the upper and lower sides of the loaded tray 30 and shrink film 12 is in contact with the surface of support 28.

If desired, a mailing label 38 or any piece of paper bearing informative printing thereon may be inserted between the shrink film 12 and the multiple air bubble material 10 (layer 14 thereof) at the indicated point 40. The shrink film 12, being transparent, permits the mailing label 38 or invoice or any other inserted piece of paper to be read therethrough while providing substantial protection for it.

Although different types of sealers may be utilized within the scope of the invention, the L-type sealer 46 illustrated may be used very advantageously. Sealer 46 has sealing arms or dies 48 and 49 with die 49 functioning with each stroke to seal a common edge 50 which is the trailing edge of package 51 and the leading edge of package 52. The sealer arm or die 48 functions to seal the edge 53 of each package which is opposite the crease or center fold 24.

A conveyor 54 transfers the packages to a heat shrink tunnel 58 where a temperature of approximately 350° F. is maintained. The packages remain in the tunnel for a few minutes until the shrink film reaches a temperature at which substantial shrinkage, up to eighty percent, has occurred. Package 51 is shown prior to entering the tunnel and package 60 is shown after it has passed through the tunnel.

Prior to the shrink tunnel treatment the shrink film 12 only loosely surrounds the multiple air bubble material 16 as indicated in FIG. 4. After the shrink tunnel treatment the shrink film 12 has shrunk into tightly fitting engagement with at least portions of the air bubble material 16, as indicated in FIG. 5, such that the air in some of the bubbles is compressed to a pressure greater than atmospheric pressure. In most instances only some of the bubbles are compressed because of the generally irregular shape of the package and the fact that neither of the layers 12 and 16 are tightly stretched after the sealing operation with the sealer 46

but prior to the package being subjected to heat in the shrink tunnel 58.

With further reference to FIG. 5, the general effect of the above described method is to provide a protective layer of compressed air by reason of the tops of the bubbles 18 being squashed down and the sides of the bubbles being distended laterally. The air in at least some of the bubbles 18 is held in a compressed state as a result of the shrinkage of the film 12 in the tunnel 58 and this compressed air functions as a cushioning material on all sides of the package. The section of FIG. 5 is a fragmentary section of the package 60 after it has passed through the heat tunnel 58 and the bubbles 18 thereof contain compressed air 62.

I claim:

1. A method for packaging articles comprising the steps of loading at least one of said articles onto a tray, providing a continuous two layer strip of material having a shrink film layer and a multiple air bubble layer, said air bubble layer comprising a base sheet and a tent sheet which forms with said base sheet a network of spaced apart air bubbles, said tent sheet being in contact with said shrink film layer, longitudinally folding said strip of material to form a center fold with the opposite halves of said base sheet being in adjacent relation to each other, placing said loaded tray between said opposite halves of said base sheet close to said center fold, forming sealed and trimmed edges to form a package, and placing said package in a heated shrink tunnel where the shrinkage of said shrink film compresses said air bubbles so that the air of at least some of said bubbles has a higher than atmospheric pressure.

2. A method according to claim 1 wherein a mailing label or the like is inserted between said shrink film layer and said tent sheet prior to said forming of said sealed edges.

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UNITED STATES PATENT OFFICE

2,438,089

PACKAGING

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Application August 27, 1946, Serial No. 693,310

7 Claims. (Cl. 18-56)

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This invention relates to a process of packaging which is particularly adapted to the packaging of soft perishable fruits and vegetables, such as peaches, tomatoes, pears, etc., or frangible articles, such as light bulbs, etc. The object to be packaged is pocketed between two heated plies of thermostretchable, heat-sealable wrapping material and is simultaneously cradled in a box or other supporting frame. Many variations in the process will be suggested by reference to the more complete description which follows in which the accompanying drawings are referred to.

In the drawings:

Fig. 1 is a diagrammatic elevation of the equipment for packaging articles as herein described;

Fig. 2 utilizes the same equipment and illustrates diagrammatically a somewhat modified operation;

Fig. 3 is an elevation in section of an article wrapped according to the process illustrated in Fig. 1; and

Fig. 4 is a section which shows diagrammatically the package resulting from the operation shown in Fig. 2.

Essentially, the fruit or other article to be wrapped is placed between two sheets of heated wrapping material which are passed between sponge rubber belts or other resilient pressure means together with the frame in which the article is to be cradled. The belts stretch or mold the sheets around the article and preferably also fasten them to the frame. A preferred wrapping material is rubber hydrochloride film although other films which perform the function of the invention may be used, such as films of vinyl products, polyethylene, and other heat-sealable, thermostretchable plastics, etc.

Fig. 1 comprises two sponge rubber belts 1 and 2, each of which is several inches thick. The sponge rubber may be fastened to any suitable base 3 which is preferably not stretchable, such as cotton, metal or the like. The belts are moved in the direction of the arrows, and at substantially the same speed. Two rolls of Pliofilm (rubber hydrochloride film manufactured by The Goodyear Tire & Rubber Company) 5 and 6 are shown for the purpose of illustration. These films, as they pass from the storage rolls, are heated by contact with the hot rollers 8 and 9 in order to make them sealable and stretchable.

As the two films 12 and 13 enter the bite between the sponge rubber rollers, the article 14, which is a fruit, vegetable or anything else that is to be wrapped, is placed between the two films, and the box or frame 15 is placed under the bot-

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tom film. This frame may be of wood, boxboard, plastic or the like. The article 14 and frame 15 are so arranged that they enter the bite together so that the pressure of the belts will stretch the films around the article and simultaneously push the article down into the frame and seal the edges of the film to it. To insure a strong bond between the films and the frame, the upper edge of the frame is coated with a material 17 to which the heated rubber hydrochloride is adherent. Figs. 1 and 3 illustrate how the film may thus be made to adhere to the top edge of the frame. After being delivered from the belts, excess film will be trimmed from the edges of the box.

Fig. 3 shows a somewhat similar operation but shows the use of multi-cellular frames. Both stock rolls of Pliofilm are located above the sponge rubber belts 20 and 21. The frames 22 each hold three articles 23 in the longitudinal direction and may hold several articles laterally. The articles may be placed in a jig or fixture and carried in this to the correct position between the films 24 and 25. Alternatively, the articles may be fed through tubes to the correct position between the films, and the tubes may be equipped for automatically delivering a single article at a time and simultaneously from each of the tubes.

In the illustration additional frames 26, the same area, etc., as the frames 22, are placed over the packaged fruit after it passes out from between the belts. These frames 26 may be of the same height as the frames 22 or may be taller or shorter. These additional frames prevent the fruit from being damaged by pressure from above. The frames 22 and 26 may be united by any suitable means, such as by taping them together with tapes 30 or by placing a rubber band around them. The films 24 and 25 might be united to the edges of the two frames with sufficient tenacity to hold them together. Any suitable means for holding the frames together will be satisfactory.

The two films need not be of the same composition. They may both be plastic but of different stretchability. For instance, the upper film may have a very high modulus so that it is stretched but little, and the sheets may be united near the top of the article. A somewhat similar effect may be produced by using plastic films of the same general composition but by having the lower film thinner and thus more easily stretched than the upper film or by having it plasticized so that it stretches more readily. The elasticity may also be controlled by heating the lower film more than the upper. Thus, the two films may be stretched

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a different amount as they enclose the article and are pressed down into the frame.

Figs. 3 and 4 show the rim of supporting film between the article and the frame which forms a resilient support which holds each article out of contact with other articles and absorbs shocks to which the package is subjected in transportation. The films fit snugly against the article so that there is no danger of the surface being damaged by abrasion. Furthermore, the article is so supported that although it is able to be moved up and down somewhat as it is jostled about when moved from one place to another, it is not given sufficient play to permit bruising by being bumped on the bottom of the frame.

It is thus seen that the invention is of rather general application and is not limited to the examples given. If the frames are multi-cellular, the films will ordinarily be united only to the outer walls and not to the partitions between the cells. The films may be transparent or pigmented. They may be of any color.

Although other heat-sealable, thermostretchable films may be used, rubber hydrochloride film is preferred. This is because other plastics must be maintained in a heated condition to make them sealable and stretchable; but rubber hydrochloride, once heated, may be stretched or sealed by pressure at any time for a considerable period thereafter, even though cooled to about 100° F. Thus, even though the rubber hydrochloride cools appreciably between the heating rolls and the sponge rubber belts, it is stretched and sealed between the belts. Machines designed for use with other heat-sealable and thermostretchable films must be enclosed so as to maintain the films at the required temperature until the stretching and sealing have been completed. The machines may be designed so that the surface speed of the heating rollers is the same as the surface speed of the sponge belts, or faster or slower depending upon whether prestretching or preshrinking of a film already stretched is desired. The apparatus employed may be changed in many respects.

What I claim is:

1. The process of packaging an article between two layers of wrapping material which comprises placing the article between them, placing a frame against the outside surface of one of the layers so that its perimeter surrounds the article, and then passing the assembly between resilient pressure means to press the layers of wrapping material together around the article and to press at least a portion of the covered article down into the frame.

2. The process of packaging an article between two layers of wrapping material, opposing surfaces of which are heat-sealable, which comprises heating the layers of the wrapping material, placing the article between them, placing a frame against the outside surface of one of the layers so that its perimeter surrounds the article, and then passing the assembly between resilient pressure means to press the layers of wrapping material over opposite surfaces of the article and to seal the layers together around the article and

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to press at least a portion of the covered article down into the frame.

3. The process of packaging an article between two layers of heat-sealable and thermostretchable wrapping material which comprises heating the layers of the wrapping material, placing the article between them, placing a frame against the outside surface of one of the layers so that its perimeter surrounds the article, and then passing the assembly between resilient pressure means to stretch the layers of wrapping material around opposite surfaces of the article and to seal them together around the article and to press at least a portion of the covered article down into the frame.

4. The process of packaging a plurality of articles between two layers of heat-sealable and thermostretchable wrapping material which comprises heating the layers of the wrapping material, placing the articles between the layers with the articles arranged in a definite pattern, placing a frame provided with cells of the same pattern against the outside surface of one of the layers so that the perimeters of the respective cells surround the respective articles, and then passing the assembly between resilient pressure means to press the respective layers over opposite surfaces of the articles and to press and seal them together around the articles and to press at least a portion of each of the resulting covered articles down into its respective cell in the frame.

5. The process of packaging an article between two layers of wrapping material which comprises placing the article between them, placing a frame against the outside surface of one of the layers so that its perimeter surrounds the article, then passing the assembly between resilient pressure means to press the layers of wrapping material against opposite surfaces of the article and to press the layers together at the perimeter of the article and to press at least a portion of the covered article down into the frame, and then placing a frame of substantially the same perimeter on top of the first-mentioned frame with the layers of wrapping material held between the two frames.

6. The process of packaging an article between two films of heat-sealable and thermostretchable wrapping material which comprises heating the films, placing an article between them, placing a frame underneath the lower of the films and then passing the assembly between resilient pressure means so as to simultaneously stretch the films over the article, seal the films together around the perimeter of the article, and push at least a portion of the article into the frame.

7. The process of packaging an article between two films of rubber hydrochloride which comprises heating the films, placing an article between them, placing a frame underneath the lower of the films and then passing the assembly between resilient pressure means so as to simultaneously stretch the films over the article, seal the films together around the perimeter of the article, and push at least a portion of the article into the frame.

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